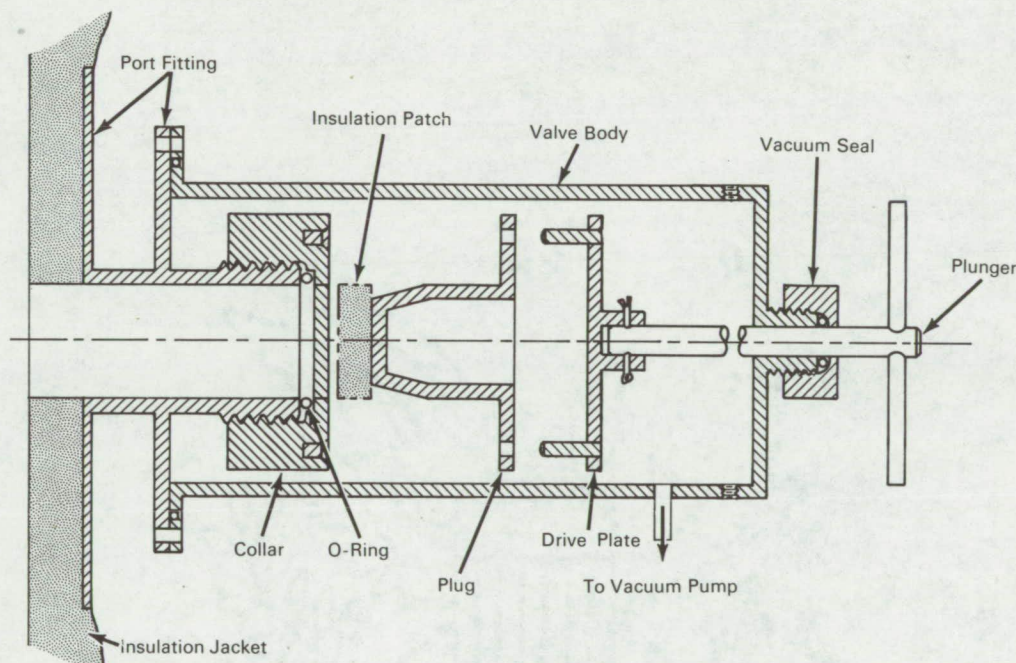


NASA TECH BRIEF



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Hand-Operated Plug Insertion Valve



The problem:

An evacuated insulation system for upper stage liquid hydrogen tanks requires an extensive vacuum plumbing system for ground hold (prelaunch) conditions. If the system can be sealed on the launch pad there is no reason to fly the bulky plumbing system. Conventional vacuum valves can be used to seal the system but these are very heavy and require support brackets which involve additional weight.

The solution:

A hand-operated plug insertion valve that is light in weight, demountable, and permits evacuation of the system plus sealing after evacuation.

How it's done:

A port fitting is bonded to the insulation jacket during fabrication of the upper stage tank. The valve body collar is assembled to the port fitting and has an internal O-ring. A vacuum source is used to evacuate the insulation jacket to the desired pressure level and the port is sealed by pushing on the valve plunger. The drive plate pins engage holes in the plug and, through the plug flange, holes in the collar. Twisting the plunger tightens the plug-to-collar interface thus compressing the O-ring to make a vacuum-tight connection. The drive plate is withdrawn and the valve body with associated vacuum plumbing is removed from the insulation jacket port fitting.

(continued overleaf)

Notes:

1. This port fitting and plug weigh only 1/7th as much as a conventional vacuum valve.
2. The plug can be fitted with a patch of insulation to provide a barrier to radiation heat transfer.
3. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 38512
Reference: B67-10466

Patent status:

No patent action is contemplated by NASA.

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